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NOTES ON THE GENUS *PARALEUROLOBUS*: REDESCRIPTION OF THE GENUS AND ITS TYPE SPECIES AND DESCRIPTION OF A NEW SPECIES (HOMOPTERA, ALEYRODIDAE)

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Abstract.—The genus *Paraleurolobus* Sampson and Drews and its type species, *P. imbricatus* Sampson and Drews, are redescribed. The pupal case, first, second and third instars of *Paraleurolobus chamaedoreae*, new species, are described. Both species are recorded from Mexico, *P. imbricatus* from an undetermined tree and *P. chamaedoreae* from narrow leaf palms of the genus *Chamaedorea*. Distinguishing characters are given for *Paraleurolobus* and for each species.

Key Words: Whitefly, *Paraleurolobus*, type species, new species, palm, Mexico

The genus *Paraleurolobus* was established by Sampson and Drews (1941) for their new species *P. imbricatus*, an aleyrodid collected "on undetermined tree" in Mexico. The authors did not mention the appearance of the whitefly on its host plant and they examined only one specimen. A more complete concept of *Paraleurolobus* was obtained through the examination of two additional specimens of *P. imbricatus* and numerous examples of a new species found on narrow leaf palms of the genus *Chamaedorea* from Mexico.

In the following descriptions, sutures of the cephalothorax and abdomen refer only to intersegmental ones.

Paraleurolobus Sampson and Drews

Paraleurolobus Sampson and Drews 1941: 168–169; 1957: 690; Sampson 1943: 196, 202; 1947: 46; Mound and Halsey 1978: 178.

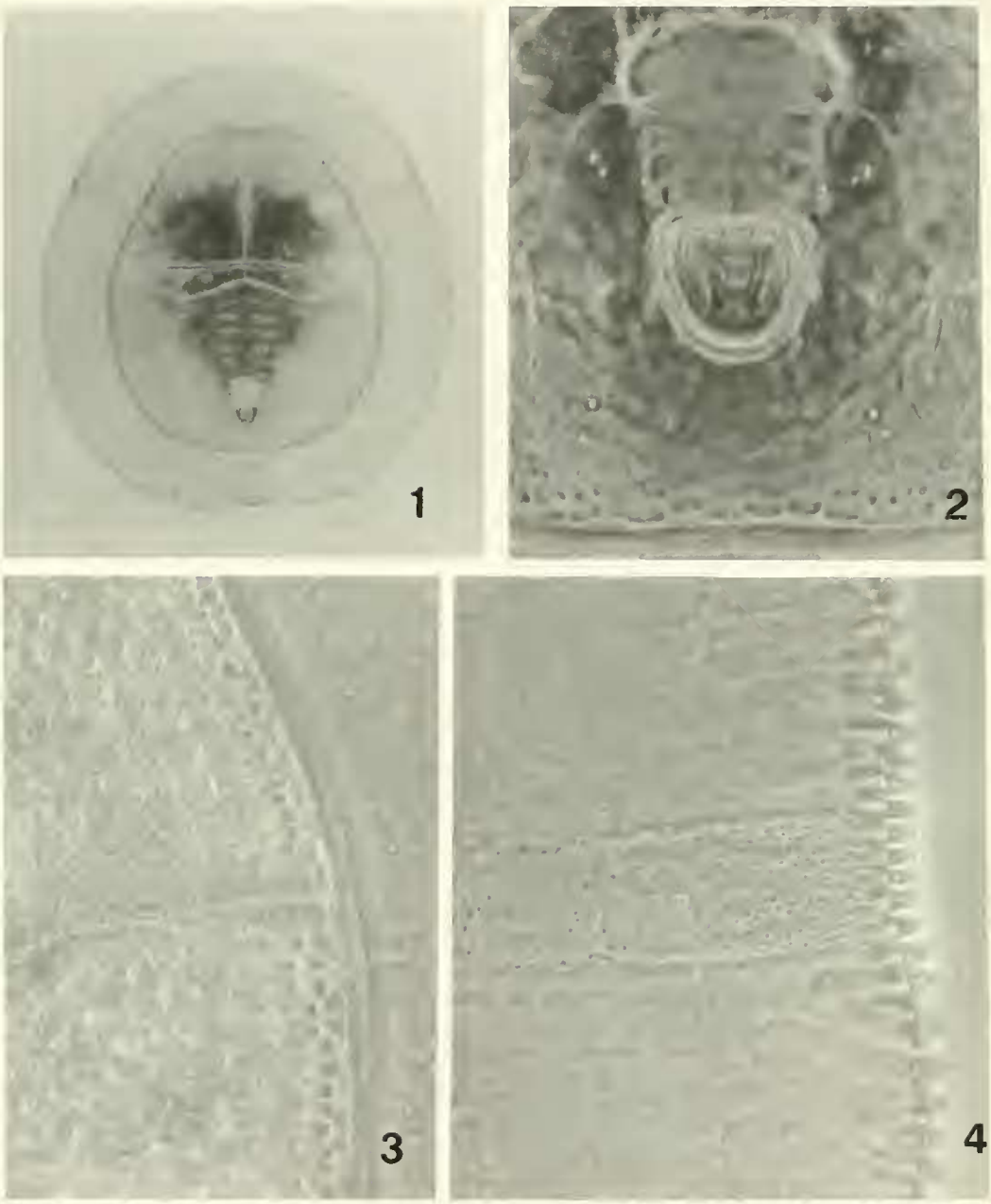
Type species.—*Paraleurolobus imbricatus* Sampson and Drews, by original designation and monotypy.

Pupal case.—Margin of body with a waxy fringe. Body subcircular in outline. Dorsum and venter nearly flat. Derm membranous and pale or sclerotic and dark.

Margin: Dentate. Anterior and posterior setae present.

Submargin: Flat, completely separated from dorsal disk by the membranous, creaselike subdorsal furrow; ornamented with ridges and furrows or sculptures; without a row of setae. Disk pores without associated porettes present.

Dorsal disk: Nearly flat, partially ornamented by imbrications, spinules, furrows or differently shaped sculptures. Eye spots present or absent. Median molting suture reaching, transverse suture approaching or reaching subdorsal furrow. Sutures evident in median area of abdomen; submedian depressions faint or not visible; pockets small. Eight segments visible in median area of abdomen. Disk pores with associated porettes present. A pair of submedian setae or setal bases on cephalic, meso- and metathoracic and eighth abdominal segments; caudal setae in, or on posterior margin of



Figs. 1–4. *Paraleurolobus imbricatus*. 1, pupal case; 2, median area of dorsal disk from seventh abdominal suture to subdorsal furrow; 3, section of thorax and abdomen showing ornamentation of dorsal disk, transverse molting suture, subdorsal furrow, proximal area of submargin; 4, section of dorsal margin, submargin and ventral thoracic tracheal fold.

the subdorsal furrow; first abdominal setae absent. Vasiform orifice subcircular or cordate; operculum nearly covering orifice and concealing the lingula; lingula extending to end of orifice, spatulate, with spinules and a pair of short setae. Caudal furrow and ridges absent.

Venter: Antennae 1-segmented, not

reaching posterior margin of forelegs. Rostrum 1-segmented. Segmentation of legs not evident. Adhesive sacs small. Thoracic spiracles very small, anterior and posterior abdominal ones slightly larger. Tracheal folds evident. Ventral abdominal setae present.

Third, second and first instars.—Without a subdorsal furrow. A pair of submedian setae on cephalic, meso- and metathoracic and eighth abdominal segments; caudal setae on body margin. Caudal furrow and ridges absent.

Because these instars are available only in *Paraleurolobus chamaedoreae*, few generic characteristics can be indicated for them.

Discussion.—Sampson and Drews (1941) stated that *Paraleurolobus* was related to, but differed from *Aleurolobus* Quaintance and Baker (1914) and *Pseudaleurolobus* Hempel (1923). In keys to genera, Sampson (1943, 1947) placed *Paraleurolobus* and *Asialeyrodes* Corbett (1935) in the same couplets thus indicating a similarity between them. These genera, and *Africaleyrodes* Dozier (1934), *Malayaleyrodes* Corbett (1935), *Yleyrodes* Bink-Moenen (1983), and the species *Tetraleurodes hederae* Goux (1939), resemble each other in having the submargin partly or entirely separated from the dorsal disk by a subdorsal furrow. Of these genera, the furrow is complete only in *Paraleurolobus* and *Yleyrodes*. *Paraleurolobus* is the only known aleyrodid genus that has a membranous, bladethin or creaselike, unbroken subdorsal furrow with the caudal setal bases in, or on the margin of the furrow.

The pupal cases of *Paraleurolobus* differ from those of other known genera in the following combination of characters: margin dentate; tracheal pore areas without pores; submargin flat, ornamented, completely separated from the dorsal disk by the membranous, creaselike subdorsal furrow, without a row of setae; dorsal disk ornamented, nearly flat; submedian cephalic, meso- and metathoracic, eighth abdominal and caudal setae or setal bases present, caudal setae in, or on the margin of the subdorsal furrow; first abdominal setae absent; vasiform orifice subcircular or cordate; operculum nearly covering the orifice and concealing the lingula; caudal furrow and caudal ridges absent.

Paraleurolobus imbricatus
Sampson and Drews
(Figs. 1–4)

Paraleurolobus imbricatus Sampson and Drews 1941: 168–169; Mound and Halsey 1978: 178.

Pupal case.—Marginal fringe broken, ⅛ width of submargin in available specimen. Dorsum with a thin covering of colorless wax.

Body subcircular in outline, 0.95–1.10 mm long, 0.85–1.00 wide. Dorsum membranous, colorless or pale yellowish with a brown tinge in center. Venter colorless.

Margin: Dentate, teeth broadly triangular, apices curved, about as long as basal width, 9–11 in 100 μ, about ¼ width of a tooth apart; 6–9 tracheal pore area teeth and 1–3 adjacent teeth slender and fingerlike; a clear, porelike area at base of each tooth. Anterior setae 16 μ long, 30 teeth apart; posterior 20 μ long, 50 teeth apart.

Submargin: Width varying slightly, about ¼ width of dorsal disk at widest part of body. Furrows extending proximad from notches between marginal teeth, other broken or coalesing furrows extending across submargin and forming flat, irregular ridges. Disk pores fairly numerous, arranged in irregular, indistinct rows, one row in distal, one in central and one in proximal area of submargin.

Dorsal disk: Ovate in outline, margin not parallel to body margin, cephalothorax narrower than abdomen. Eye spots absent. Ornamented, except in median area of abdomen, with broken and straight furrows, imbrications and variously shaped sculptures, many with distal margin pale, and with numerous minute, scattered, clear spots. A pair of subcircular, slightly de-

pressed areas in meso- and metathorax. Transverse molting suture curved slightly caudad from its midpoint, recurved and approaching or reaching subdorsal furrow opposite its midpoint. Cephalothoracic and pro-mesothoracic sutures faint, meso-metathoracic and abdominal sutures defined in median and submedian areas.

At median line of dorsal disk, cephalic segment 3¼ times length of prothorax; prothorax equal to the mesothorax, each about 2 times length of metathorax; abdominal segment I slightly longer than II; II slightly longer than subequal III–VI; VII ½ length of V; VIII ¾ combined length of I–VII. Submedian depressions shallow, with furrows extending cephalad and caudad. Pockets shallow, located diagonally in seventh abdominal suture. Pairs of disk pores with associated porettes arranged approximately as follows: cephalic, pro- and mesothoracic segments, each 1 inner and 1 outer submedian; metathorax, 1 inner, 1 central and 1 outer submedian; abdominal segment I, 1 inner submedian; III, 1 inner and 2 central and 1 outer submedian; IV, 1 inner and 1 outer submedian; V, 1 inner and 1 central submedian; VI, 1 central submedian; VII, 1 inner and 1 central submedian; VIII, 1 inner and 1 outer submedian. Cephalic, meso- and metathoracic setal bases minute, with or without very minute setae; eighth abdominal setae 2 μ long, located cephalolaterad of vasiform orifice near an imaginary longitudinal line through lateral margins of vasiform orifice; caudal setal bases minute, in margin of subdorsal furrow. Vasiform orifice subcircular, 48 μ long, 52 wide, broadly curved posteriorly, located about 1¼ times its length from seventh abdominal suture and from subdorsal furrow; rim absent from anterior end, rising slightly above derm elsewhere; inner walls with numerous minute spinules posteriorly, its bottom extending ⅓ length of operculum. Operculum subcircular, 38 μ long, 42 wide.

Venter: Antennae extending ⅝ length of forelegs, distal third tapered, apices with a few spinules and 2 or 3 setae. Tracheal folds with numerous spinules. Abdominal setae 20 μ long.

Redescribed from the holotype and two paratypes collected on an undetermined tree, Chivela, Oaxaca, Mexico, April 1926, G. F. Ferris.

Discussion.—In *Paraleurolobus imbricatus,* the submedian cephalic setal bases are very minute and are not always visible. The meso- and metathoracic setal bases also are very minute and their setae are almost invisible. The intricate ornamentation of the dorsal disk, when viewed under high magnification, has a sparkling appearance. The location of the pockets in a diagonal instead of a transverse position in the seventh abdominal suture is unusual, but this characteristic might vary.

Some characteristics of the venter are not determinable in available specimens. The presence or absence of spinules on the abdomen, of setae or setal bases near the disk of legs and of sculpture have not been determined.

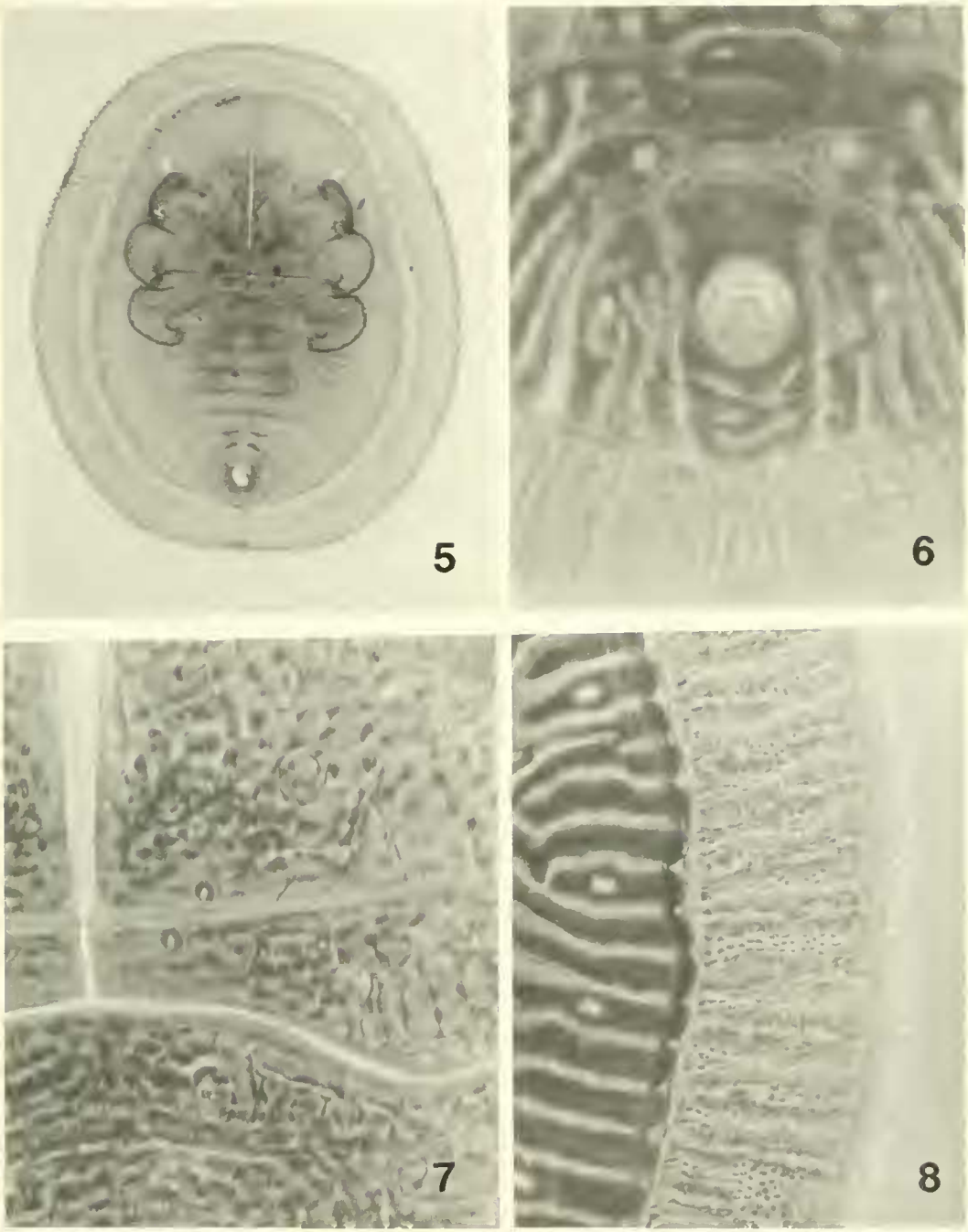
Paraleurolobus chamaedoreae Russell, New Species
(Figs. 5–14)

Pupal case.—Living on the lower surface of leaves and occasionally on the upper surface.

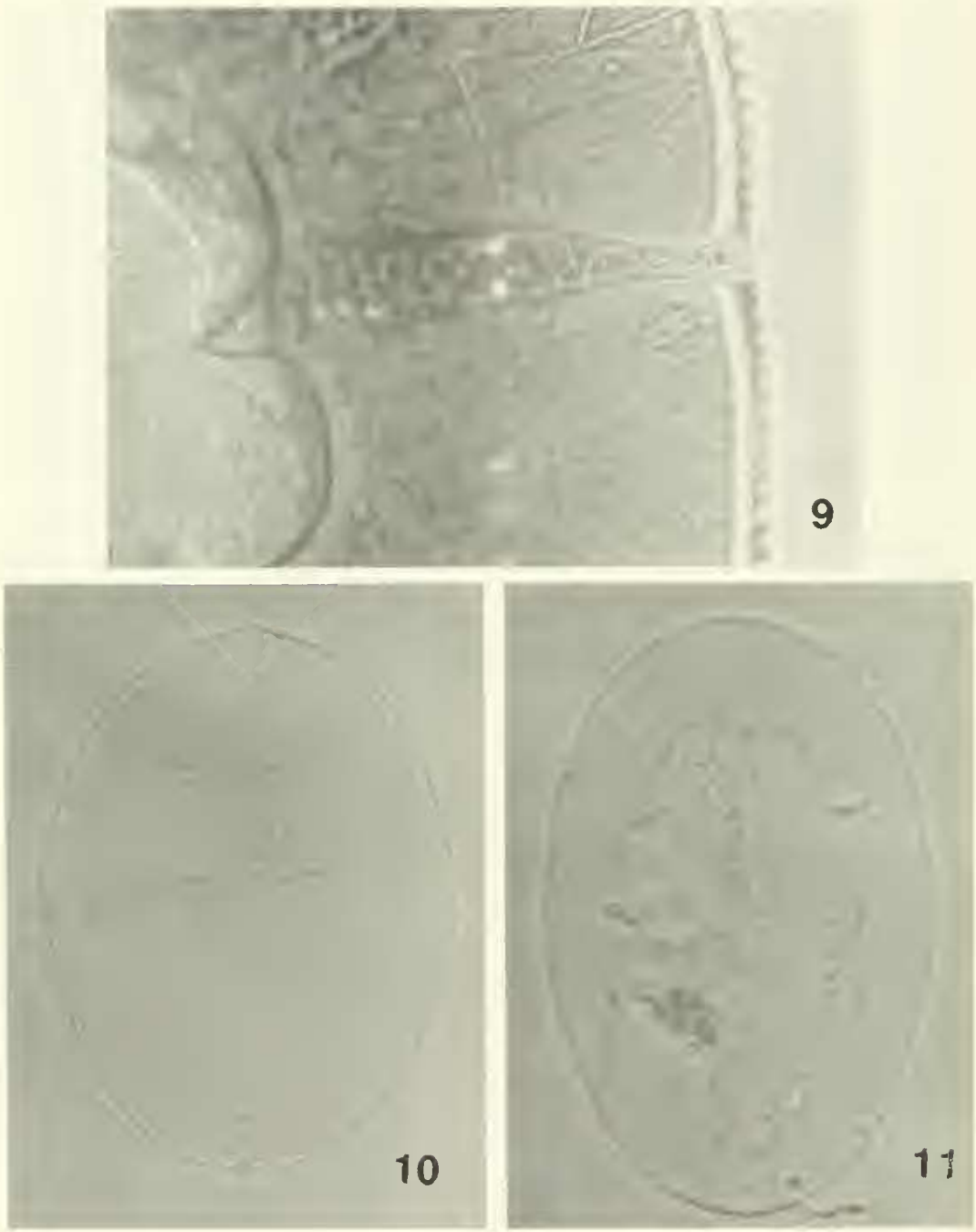
A border of white, shiny, translucent, contiguous, waxy rods, each about ¼ longer than width of submargin, around body margin. Dorsum with a thin covering of colorless, transparent wax. Venter with white wax in tracheal folds.

Body subcircular to ovate in outline, 0.65–0.90 mm long, 0.55–0.75 wide, females larger than males. Dorsum sclerotized, shining, entirely black or submargin occasionally dark reddish brown. Venter black or pale.

Margin: Dentate, teeth squarish, slightly tapered, apices truncate or broadly curved, as long as basal width, 12–14 in 100 μ, about ⅓ width of a tooth apart; 3–6 tracheal pore



Figs. 5–8. *Paraleurolobus chamaedoreae*. 5, pupal case; 6, median area of dorsal disk from sixth abdominal suture to body margin; 7, section of thorax and abdomen showing ornamentation, median and transverse molting sutures, meso- and metathoracic setal bases; 8, section of distal area of dorsal disk, subdorsal furrow, submargin and margin.



Figs. 9–11. *Paraleurolobus chamaedoreae*. 9, section of venter from margin to submedian area, spinules not visible; 10, third-instar larva; 11, first-instar larva.

Figs. 12–13. *Paraleurolobus chamaedoreae.* 12, first-instar larva appressed to second-instar larva; 13, second-instar larva.

area teeth slenderer and closer together than other teeth; a clear, porelike area at base of each tooth. Anterior setae 12 μ long, 20–36 teeth apart; posterior 20 μ long, 26–40 teeth apart.

Submargin: Width nearly uniform, about ⅛ width of dorsal disk at widest part of body. Furrows and ridges extending from margin toward or to subdorsal furrow, ornamented with numerous clear spots resembling minute bubbles. Disk pores sparse, scattered, 1 or 2 at any point.

Dorsal disk: Subcircular to ovate in outline, margin nearly parallel to body margin. Eye spots oval to circular. Ornamented with narrow furrows and wide, flat ridges extending from subdorsal furrow to median area where straight, crooked or curved lines form variously shaped designs. Transverse molting suture extending slightly caudad from its midpoint, recurved and terminating just before subdorsal furrow nearly opposite its midpoint. Cephalothoracic and pro-mesothoracic sutures faint, meso-metathoracic and abdominal sutures distinct in median and submedian areas. At median line of dorsal disk, cephalic segment 2½ times length of prothorax; prothorax about ⅓ longer than mesothorax; mesothorax about 2 times length of metathorax; abdominal segment I slightly longer than subequal II–VI; VII about ½ length of VI; VIII about equal to combined length of I–III. Submedian depressions rarely evident. Pockets shallow or not evident. Pairs of disk pores with associated porettes more numerous in

Fig. 14. *Paraleurolobus chamaedoreae*. 14, pupal case on palm leaf, marginal fringe broken.

females than in males, arranged approximately as follows: cephalic segment, 2 inner submedian, 2 or 3 outer submedian; prothorax, 0 or 1 outer submedian; mesothorax, 1 inner submedian, 0–2 outer submedian; metathorax, 0 or 1 inner submedian, 1 outer submedian; abdominal segment I, 1 inner submedian, 0 or 1 outer submedian; II, 0–2 outer submedian; III, 1 inner submedian, 0–2 outer submedian; IV, 0 or 1 inner submedian; 1 or 2 outer submedian; V, 0 or 1 inner submedian, 0–2 outer submedian; VI, 0–2 outer submedian; VII, 1 inner submedian, 0 or 1 outer submedian; VIII, 1 inner or outer submedian, 1 sometimes in a pocketlike depression opposite posterior end of vasiform orifice. Cephalic, meso- and metathoracic setal bases relatively thick walled, apparently without setae; eighth abdominal setae 1 μ long when observed, their bases relatively thin walled, located cephalolaterad of vasiform orifice nearly halfway to seventh abdominal suture, distad of an imaginary longitudinal line through lateral margins of vasiform orifice; caudal setal bases minute, without setae, in, or on margin of subdorsal furrow. Vasiform orifice cordate, 24–28 μ long and wide, located approximately 1⅕ times its length from seventh abdominal suture and from subdorsal furrow; rim present around entire orifice; inner walls smooth, slightly curved outward, its bottom not extending anteriorly. Operculum cordate, 20–24 μ long and wide.

Venter: Submargin smooth or with shallow furrows, rarely appearing porous at anterior end. Antennae extending ¾ length of forelegs, base often with a flange extending toward rostrum from proximal margin and a knob on distal margin; apices narrowed, pointed, with a few minute spinules and 1 seta. A pair of minute setae rarely present anterior to rostrum. Tracheal folds with a few spinules, rough areas and sometimes 2 or 3 clear spots at midlength. Each leg with 2 minute setae at disk; middle and hind legs with 1 or 2 minute setae at midlength of proximal margin. A band of bubblelike spinules extending from rostrum around distal margin of legs, continued on abdomen and across abdominal tracheal fold. Abdominal setae 25 μ long.

Third-instar larva.—Body broadly oval

in outline, 0.45–0.55 mm long, 0.40–0.45 wide. Dorsum and venter pale brown.

Margin: Dentate, teeth slightly wider than long, apices broadly curved; 7–9 at thoracic, 9–12 at posterior tracheal pore area slenderer than other teeth, their apices narrowly curved. Anterior and posterior setae about 20 μ long.

Dorsum: Intersegmental sutures weak. Submedian depressions and pockets evident. Disk pores with porettes varying but usually 1 inner submedian pair on most segments and occasionally 1 outer submedian pair on some thoracic and abdominal segments. Disk pores without porettes sparse, in submargin, median and submedian areas. Cephalic, meso- and metathoracic setae and setal bases rather stout, setae about 6 μ long; eighth abdominal setae slenderer, 6 μ long, opposite rim on anterior end of vasiform orifice; caudal setae 54 μ long. Vasiform orifice cordate, 20 μ long and wide, rim present around entire orifice, its inner walls smooth. Operculum cordate, about 19 μ long and wide.

Venter: Antennae 8 μ long, apparently 2-segmented, proximal segment stout, with 1 seta, distal segment slender. Legs broadly conical, without obvious segmentation, each with 2 minute setae on basal area and 2 setal bases at disk. Tracheal folds not observed. Abdominal setae 10 μ long.

Second-instar larva.—Body oval in outline, 0.34 mm long, 0.24 wide. Dorsum and venter pale. Area depressed underneath the closely appressed first-instar larva.

Margin: Dentate, teeth as wide as long, apices curved, 8–10 at thoracic, 12–20 at posterior tracheal pore area slenderer than other teeth. Anterior and posterior setae about 20 μ long.

Dorsum: Intersegmental sutures, submedian depressions and pockets not observed. Disk pores with porettes in 1 or 2 submedian pairs on each cephalothoracic, and on abdominal segment III. Disk pores without porettes sparse, in submargin and submedian areas. Cephalic setae 50 μ long; meso- and metathoracic setae about 90–100 μ long including enlarged base, each seta with 2 porelike areas at juncture with base; eighth abdominal setae 4 μ long, opposite rim on anterior end of vasiform orifice; caudal setae 40 μ long. Vasiform orifice cordate, 16 μ long and wide, rim present around entire orifice. Operculum cordate, about 14 μ long and wide.

Venter: Antennae 7 μ long, a minute seta at base. Legs without obvious segmentation, each with 1 or 2 minute setae on basal area and 2 setal bases at disk. Tracheal folds not observed. Abdominal setae 9 μ long.

First-instar larva.—Body elliptical in outline, 0.24 mm long, 0.16 wide; closely appressed to second-instar larva. Colorless.

Margin: Slightly indented between segments. Setae in 5 pairs on cephalothorax, each about 12 μ long; typical anterior setae 20 μ long, posterior setae 28 μ long.

Dorsum: Intersegmental sutures weak or not evident. Eye spots circular when evident. Disk pores with porettes in 1 pair on cephalic segment, 0–3 pairs on thorax and abdomen. Disk pores without associated porettes sparse, 2–10 in submargin. Cephalic, meso- and metathoracic and eighth abdominal setae each 2–3 μ long; caudal setae 8 μ long. Vasiform orifice cordate, 14 μ long and wide, rim absent from anterior end. Operculum cordate, about 12 μ long and wide.

Venter: Antennae 60 μ long, 3-segmented; proximal segment stout, with 1 seta; second segment narrower, with 1 seta; distal segment slender, blunt apically, 50 μ long. A pair of minute setae just anterior to rostrum. Legs appearing 3-segmented; coxae poorly defined; foreleg coxae without, middle and hind leg coxae with 2 setae; trochanter apparently fused with stout femur; tibio-tarus narrower, forelegs apparently without, middle and hind legs with a seta on distal margin; tibio-tarsus of each leg with a minute seta on proximal margin and a digitule at apex. Tracheal folds not observed. Abdominal setae 10 μ long.

Material examined.—All specimens are from Mexico, intercepted by plant quarantine inspectors of the U.S. Department of Agriculture each month of the year from 1946 to 1984. Collections were discontinued because the insects could not be identified to species.

Holotype pupal case on *Chamaedorea* sp., collected at San Antonio, Texas, 6-VIII-1970, D. Johnston. Paratypes, unmounted and four mounted pupal cases taken with the holotype.

Additional paratypes consist of numerous unmounted and approximately 445 mounted pupal cases, seven lots collected from unidentified palm (apparently *Chamaedorea*), one lot from *C. elegans* Mart. and all others from *Chamaedorea* sp. The paratypes were intercepted from the following states and locations in Mexico: Chiapas (Arriaga, locality unstated), Chihuahua (Juarez), Mexico (Mexico City, Mexico D.F., locality unstated), Nueva Leon (Zaragoza), Tabasco (locality unstated), Tamaulipas (Matamoras, Tampico, Victoria), Vera Cruz (Tuxtla, locality unstated). Paratypes were intercepted at the following United States quarantine stations: California (Los Angeles, San Pedro, San Ysidro), Illinois (Chicago), New York (John F. Kennedy International Airport), Texas (Brownsville, Dallas, Eagle Pass, El Paso, Laredo, Nogales, San Antonio).

In the collections listed there are 16 third-instar, six second-instar and seven first-instar larvae.

The holotype and most paratypes of *P. chamaedoreae* are deposited in the collection of the National Museum of Natural History (USNM), Beltsville, Maryland. Other paratypes are in California Department of Food and Agriculture, Sacramento; Florida State Collection of Arthropods, Gainesville; and Department of Entomology, The Natural History Museum, London, England.

Discussion.—In pupal cases of *Paraleurolobus chamaedoreae*, the cephalic, meso- and metathoracic setal bases are prominent in bleached specimens. A minute, dark dot was the only evidence of setae that I observed in these setal bases. In earlier instars these setal bases have minute setae in the first and third instars and elongate ones in the second instar. When the first-instar larvae are closely appressed to the second-instar larvae, it is virtually impossible to determine from which form the long setae arise and to correctly interpret some other structures. The elongate antennae of first-instar larvae are in sharp contrast to the short antennae of the second- and third-instar larvae. The number of disk pores with associated porettes and disk pores without associated porettes varies greatly in pupal cases and in the larval instars.

There was no evidence of adult whiteflies or parasitoids in the numerous pupal cases I examined.

Paraleurolobus chamaedoreae differs from *P. imbricatus* in its smaller size, dark color, different ornamentation of the dorsum, presence of eye spots, distribution of pores and characteristics of the vasiform orifice.

Acknowledgments

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